

Application

Advocate South Suburban Hospital 2.0 MW CHP Application

Fact Sheet

A snowstorm in 1998 left many residents of Hazel Crest, Illinois without electric power for over six hours. Advocate South Suburban Hospital, located amongst these stranded residents, remained operating at full capacity, thanks to their Combined Heat and Power (CHP) systems that supplied all their needed electricity, heating and cooling. Today, the hospital operates two separate CHP systems, in parallel with the grid, with an electric generating capacity near 2.0 megawatts. In 1997, a project installing a direct-fired gas absorption chiller, upgrading a cooling tower and installing a CHP system, incorporating a 1,050 kilowatt Waukesha engine generator with heat recovery, generated annual savings of at least \$200,000.

QUICK FACTS*

Guaranteed Savings: \$200,000
Installed Cost: \$1.7 Million
Simple Payback: 8 Years

Generating Capacity: 1.05 Megawatts

Operation Since: Fall, 1997 Facility Size: 325 Beds

 Data in Quick Facts represent s 1997 installed CHP system, cooling tower and gas absorption chiller only. The savings and payback do not reflect the 1971 CHP installation. "Some machines and equipment, such as the MRI units are unable to be used while on backup generators. With the onsite generation system, we have three levels of security for our patients," says Lamar Davis, Director of Facilities Management.

REASONS FOR CHP

"HIGH ENERGY COSTS" & "POWER RELIABILITY"

1971 – When the hospital opened, the local electric utility could not supply 450 voltage electricity to Hazel Crest. Therefore, a stand alone 900 kW CHP system was installed to provide all cooling, heating and power needs. 1973 – The 900 kW CHP system was tied in parallel to the grid.



1993 – The hospital, located at the end of the electric utility's feeder, experienced frequent brown outs during the summer. The hospital also experienced 19 power outages forcing MRI's and CAT scans to be reset and to back up appointments.

1997 – Due to hospital expansion, high energy costs and poor quality electricity, Nicor Gas was contracted to install a 1,050 kW Waukesha engine generator with heat recovery for hot water. The hospital's total generating capacity was now 2.0 MW.

SYSTEM EQUIPMENT

- 3 x 300 kW Caterpillar natural gas reciprocating engines with heat recovery
- One Waukesha 7100 GSI 1,050 kW natural gas engine generator set with jacket water heat recovery only
- Switch gear and controls manufactured by Electric Controls of Peoria, Illinois
- One 400-ton hot water absorption chiller

CHP OPERATION

The CHP systems operate on different schedules and contracts with the electric utility:

- North-South Building: Operates during Commonwealth Edison's 9:00AM – 10:00PM On-Peak Energy Period.
- East-West Building: Operates during ComEd's 9:00AM – 6:00PM On-Peak Demand Period.

The CHP systems operate in parallel with ComEd under ComEd's interconnect requirements. Backup power is purchased under ComEd's Rate 18. The engine generators and absorption chillers are shut down during the off-peak hours and the centrifugal and screw chillers are operated when the electric rates are low.

CHP BUILDING EQUIPMENT CONFIGURATIONS

North-South Building

3 x 300 kW CAT engines (1971) Operating Schedule: 8:10AM – 10:30PM, weekdays

Recovered Heat: Building Heat, Hot Water, & Hot Water Absorption Chiller

Additional Cooling: Centrifugal Chiller 2 x 200-ton Screw Chillers

East-West Building

1,050 kW Waukesha engine (1997) Operating Schedule: 8:35AM – 6:30PM, weekdays

> Recovered Heat: Domestic Hot Water

Additional Cooling: Centrifugal Chiller 580-ton York Gas Chiller

ADDITIONAL FACTS

- Advocate South Suburban Hospital in 2002 generated 5,200,000 kWh of electric power and purchased 9,880,000 kWh from the electric utility
- Charles Equipment Company supplied the Waukesha engine and Nicor Energy Solutions provided the analysis and installation of the 1997 CHP system
- The hospital incurred only 3 instantaneous outages in 2002 compared to 19 in 1993
- Recovering more waste heat (steam) off the Waukesha engine for the East-West Building is in the future plans of Advocate South Suburban Hospital

For further information contact

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www.CHPCenterMW.org

8 year
payback on
\$1.7 M
CHP and
Absorption
Chiller
Project

\$200,000
annual
energy
savings on
1997 CHP,
cooling
tower, and
gas
absorption
chiller
installation

19 instantaneous outages in 1993, Reduced to 3 outages in 2002

